

# Work Order ID 50991

July 29, 2009 2:25:56 PM



Page 1

Item ID: D212-664-201TRN

Accept



Setup Start



Revision ID: C

Stop



Item Name: Crosstube Turning Detail

Start Date: 7/31/09

Start Qty: 1.00



Cust Item ID:

Required Date: 8/07/09

Req'd Qty: 1.00



Customer:

Reference:

*W*

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start



QC:

Date:

SPC (Y/N):

Date:

Stop



Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Draw  
Number

Draw  
Rev.

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

Draw Nbr

Revision Nbr

D212-664-241

Rev C

100

0.00



Mori Seiki

Mori Seiki CNC Lathe Large

MORI SEIKI CNC LATHE LARGE

Memo

0.00

1-Fill tube with sand & install plugs DT8534 on both ends as per Folio  
FA114□2-Turn first side as per Folio FA114□3- File transition lines smooth.

*Q.M 09-08-11 0*

110

0.00



QC

Quality Control

QC1- Inspect dimensions to dimension sheet

Memo

0.00

*Q.M 09-08-11 0*

120

0.00



Mori Seiki

Mori Seiki CNC Lathe Large

MORI SEIKI CNC LATHE LARGE

Memo

0.00

1-Turn second side as per Folio FA114□2- File transition lines smooth.□3-  
Remove sand and plugs□4- scribe batch # and part # as per dwg

*Q.M 09-08-11 0*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

**Work Order ID 50991**

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Page 2

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Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start



QC:

Date:

SPC (Y/N):

Date:

Stop

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run HoursDraw  
NumberDraw  
Rev.Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

130



QC

Quality Control

QC1- Inspect dimensions to dimension sheet

0.00

Memo

0.00

0.00 0.00 - 0.08 = 11.00

140



QC

Quality Control

QC8- Inspect parts - second check

0.00

Memo

0.00

AWM 9-8-12

150



HandFXtube

Hand Finishing Crosstubes

Crosstubes Chemical Conversion

0.00

Memo

0.00

Chemical Conversion Coat as per within 24 hours of machining

1 J - AWM 9-5-12

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

# Work Order ID 50991

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Page 3

Item ID: D212-664-201TRN

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Setup Start



Revision ID: C

Stop



Item Name: Crosstube Turning Detail

Start Date: 7/31/09

Start Qty: 1.00



Cust Item ID:

Required Date: 8/07/09

Req'd Qty: 1.00

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start



QC:

Date:

SPC (Y/N):

Date:

Stop



Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Draw  
Number

Draw  
Rev.

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

160

QC3- Inspect Part Finish

0.00



QC

Memo

0.00

Quality Control

am 09-08-12 ①

170

Packaging

0.00



Packaging

Memo

0.00

Packaging

Identify and stock in kanban rack Location:

X-TUBE CELL

1 9 - HW M9-8-12

180

QC21- Final Inspection - Work Order Release

0.00



QC

Memo

0.00

Quality Control

CY 09/08/12

209-08-12

12

am 09-08-12 ①

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

# Picklist Print

July 29, 2009 2:25:55 PM

Page 1 / 1

Work Order ID: 50991

Parent Item: D212-664-201TRNRevC

Parent Item Name: Crosstube Turning Detail

Comments:

Start Date: 7/31/09

Required Date: 8/07/09

Start Qty: 1.00

Required Qty: 1.00

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Remaining Qty To Pick	Qty Issued	Date Issued	Status
---------------------------------	------------------------	---------------	-------------	---------------------	------------------	-----------------	--------------------	----------------	--------------------------	---------------	----------------	--------

D6006-129RevA

Manufactured

No

120

Each

64.0000

1.0000



Crosstube Material

Q.M 09-08-11

## Warehouse

## Loc Qty

## Loc Code

### Location

Main Warehouse

LG

64

23970

2

26550

15

34690

11

38338

36

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



**DART**

u/o 50991

**RELEASED**  
07.04.24 P  
PER ECN 089**DEO ATTACHED**

DESIGN <i>PH</i>	DRAWN BY <i>PH</i>	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>J</i>	APPROVED <i>[Signature]</i>	DRAWING NO. D212-664-241	REV. C SHEET 1 OF 3
DATE 07.03.08		TITLE CROSSTUBE ASS'Y (205/212 HI AFT)	SCALE NTS
A	00.12.12	NEW ISSUE	
B	05.02.04	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	
C	07.03.08	REMOVE -1009 ABRASION STRIP; ADD MAGNOBOND 6398, CUSHION, REVERSE CLAMPS	

Qty	Part Number	Description
X	D212-664-241	CROSSTUBE ASSEMBLY (205/212 HIGH AFT)
1	D6006-129	CROSSTUBE
2	D2940-1	SUPPORT
4	D3595-063-530	RUBBER CUSHION
4	MS21920-28	CLAMP (OR MS21920-30)
A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947- 100, TYPE II, CLASS 2 ADHESIVE)

**GENERAL NOTES:**

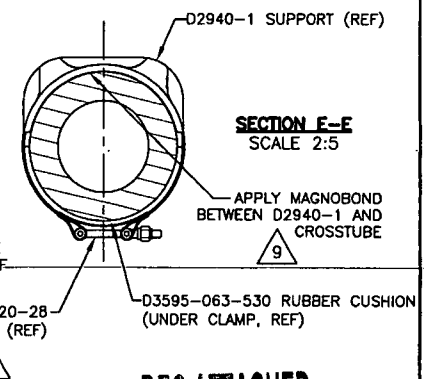
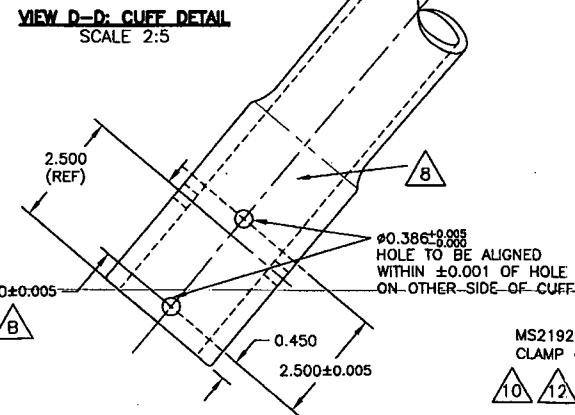
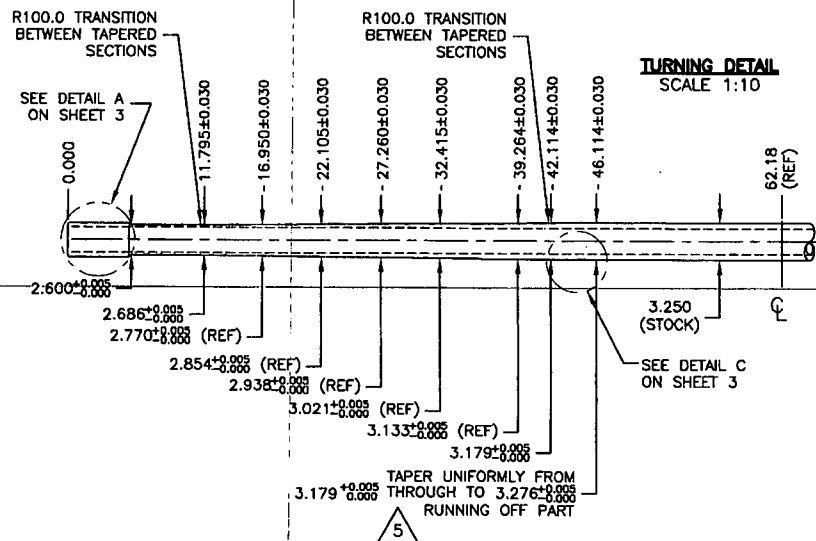
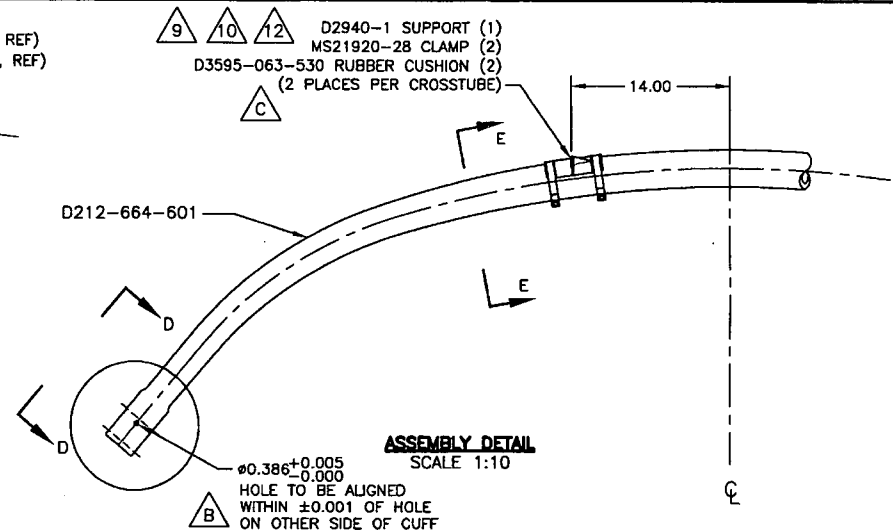
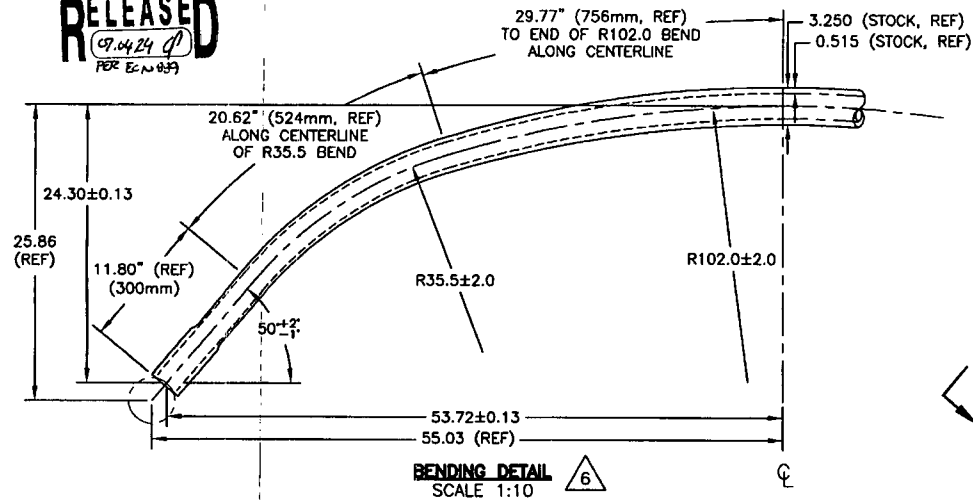
- 1) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED
- 2) MATERIAL: MANUFACTURED FROM D6006-129  
FINISHED LENGTH = 124.36±0.020
- 3) ~~FINISH:~~ CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 4) PART IS SYMMETRIC ABOUT CENTERLINE
- 5) RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 6) BEND PROGRESSIVELY WITH A MINIMUM OF 5 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 7) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 8) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 9) INSTALL D2940-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 10) INSTALL MS21920-28 CLAMPS WITH D3595-063-530 RUBBER CUSHIONS TO SECURE D2940-1 SUPPORT ON TOP SIDE OF CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT  
**NOTE:** MS21920-30 CLAMPS CAN BE USED TO ACCOMMODATE VARYING DIAMETERS. ENSURE THERE IS A MINIMUM OF 1.5 THREADS IN SAFETY ON THE NUTS.
- 11) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 12) TORQUE CLAMPS 80 TO 100 IN-LB.

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**RELEASED**  
07.04.24  
PER EC AD 039

W/O 50991



**DEO ATTACHED**

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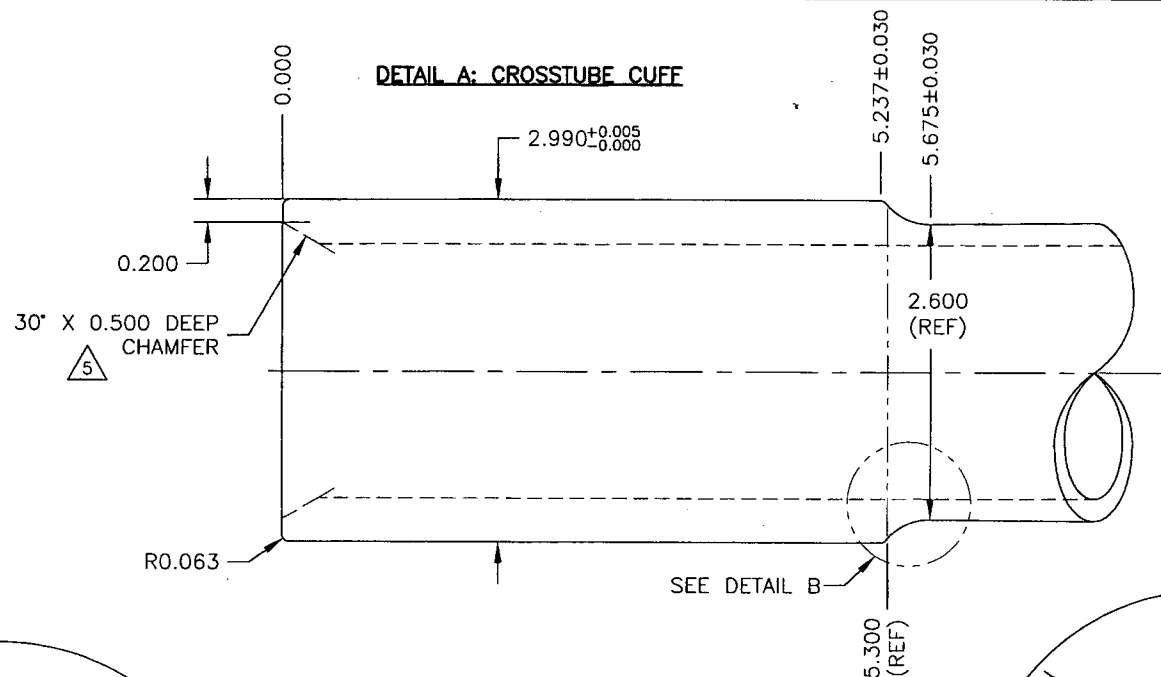
DESIGN PH	DRAWN BY PH	<b>DART</b>	DART AEROSPACE LTD. MARRISBURY, ONTARIO, CANADA
CHECKED J	APPROVED A	DRAWING NO. D212-664-241	REV. C SHEET 2 OF 3
DATE 07.03.08	TITLE CROSSTUBE ASS'Y (205/212 HI AFT)	SCALE 1:10	

W/O 50991

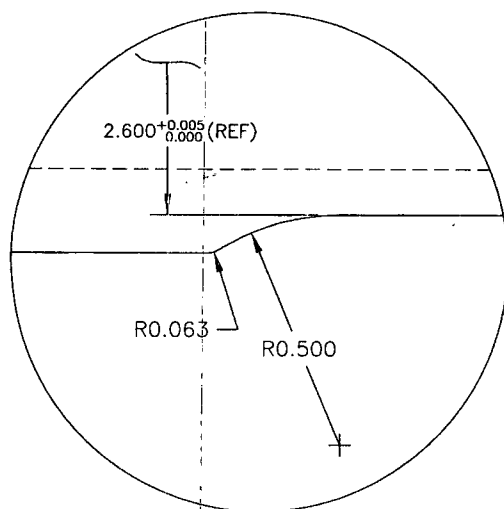
**RELEASED**  
 07.04.24  
 PER ECN 889

**DEO ATTACHED**

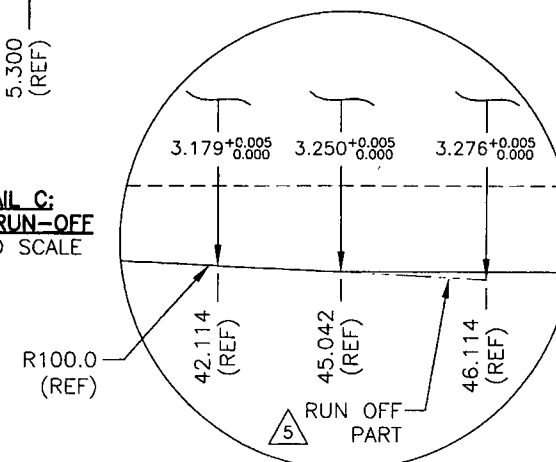
**DETAIL A: CROSSTUBE CUFF**



**DETAIL B: CUFF  
 TRANSITION  
 SCALE 4:1**



**DETAIL C:  
 TAPER RUN-OFF  
 NOT TO SCALE**



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 DART AEROSPACE LTD.

DESIGN PH	DRAWN BY PH	<b>DART</b>	DART AEROSPACE LTD. MARKHAM, ONTARIO, CANADA
CHECKED PH	APPROVED PH	DRAWING NO. D212-664-241	REV. C SHEET 3 OF 3
DATE 07.03.08	TITLE CROSSTUBE ASS'Y (205/212 HI AFT)	SCALE 1:1	

DRAWING NO. D212-664-241	TITLE CROSSTUBE	REV. C	DART AEROSPACE LTD ENGINEERING ORDER		D.E.O. NO. D212-664-241-C-1	SHEET NO. SHEET 1 OF 1	SCALE NTS
DRAWN <i>CP</i>	CHECKED <i>RT</i>	MFG. APPR. <i>E</i>	APPROVED <i>MD</i>		DE APPR. <i>RT</i>		
DATE 09.05.01	DATE 09.06.15	DATE 09.06.15	DATE 09/06/16		DATE 09/06/16		

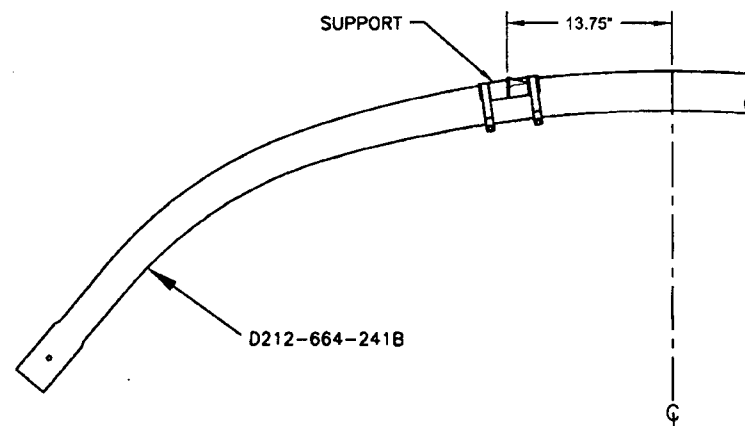
**CHANGE:**

ADD THE FOLLOWING CROSSTUBE ASSEMBLY:

Part Number	Description
D212-664-241B	CROSSTUBE ASSEMBLY (214 HIGH AFT)

THE D212-664-241B CROSSTUBE HAS THE SAME PARTS LIST AS THE D212-664-241 CROSSTUBE. HOWEVER, INSTALL THE SUPPORTS AS SHOWN IN FIGURE 1 OF THIS ENGINEERING ORDER. THE NEW KIT IS OTHERWISE ASSEMBLED PER THE D212-664-241 CROSSTUBE.

**RELEASED**  
*09/06/22 MD*



**FIGURE 1 - SUPPORT INSTALLATION**

<b>DART AEROSPACE LTD</b>		<b>Work Order:</b> B 50991
<b>Description:</b> Crosstube Assembly (205/212 High Aft)		<b>Part Number:</b> D212-664-241
<b>Inspection Dwg:</b> D212-664-241 Rev: C		<b>Page 1 of 1</b>

### FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article
 ☐ Prototype

	Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	0.200	+/-0.010	0.200	/			
	R0.063	+/-0.010	R0.063	/			
	2.990	+0.005/-0.000	2.990	/			
	5.237	+/-0.030	5.250	/			
	2.600	+0.005/-0.000	2.602	/			
	2.686	+0.005/-0.000	2.690	/			
	2.770	+0.005/-0.000	2.775	/			
	2.854	+0.005/-0.000	2.859	/			
	2.938	+0.005/-0.000	2.941	/			
	3.021	+0.005/-0.000	3.026	/			
	3.133	+0.005/-0.000	3.137	/			
	3.179	+0.005/-0.000	3.180	/			
SIDE B	0.200	+/-0.010	0.200	/			
	R0.063	+/-0.010	R0.063	/			
	2.990	+0.005/-0.000	2.990	/			
	5.237	+/-0.030	5.250	/			
	2.600	+0.005/-0.000	2.602	/			
	2.686	+0.005/-0.000	2.690	/			
	2.770	+0.005/-0.000	2.775	/			
	2.854	+0.005/-0.000	2.859	/			
	2.938	+0.005/-0.000	2.941	/			
	3.021	+0.005/-0.000	3.026	/			
	3.133	+0.005/-0.000	3.137	/			
	3.179	+0.005/-0.000	3.180	/			
	124.36	+/-0.020	124.375	/			

<b>Measured by:</b> C.A.	<b>Audited by:</b> [Signature]	<b>Prototype Approval:</b>	N/A
<b>Date:</b> 09-08-11	<b>Date:</b> 9-8-11	<b>Date:</b>	N/A

Rev	Date	Change	Revised by	Approved
A	05.04.27	New Issue (P/O D412-664-201)	KJ/JLM	
B	06.03.09	Tolerance for 5.237 was +/-0.001	KJ/JLM	
C	07.05.08	Dwg Rev. updated	KJ/JLM [Signature]	[Signature]